

WHAT IS CLAIMED IS:

1. A fuel cell system comprising:

a fuel-line water recovery tank collecting water discharged from a fuel electrode outlet of a fuel cell;

5 a fuel-line water discharge discriminator discriminating to find whether collected water in the fuel-line water recovery tank is to be discharged;

a combustor disposed in a downstream of a fuel-line water discharge port of the fuel-line water recovery tank to allow fuel expelled from the fuel-line water discharge port to be combusted with oxidant expelled from an oxidant electrode outlet of the fuel cell; and

10 a fuel-line water discharge flow passage closure unit operative to open and close a fuel-line water discharge flow passage between the fuel-line water discharge port and the combustor; wherein

15 when the fuel-line water discharge discriminator discriminates that the collected water is to be discharged, the fuel-line water discharge flow passage closure unit is opened.

2. The fuel cell system according to claim 1, further comprising:

20 a second water recovery tank disposed between the combustor and the fuel-line water discharge flow passage closure unit.

3. The fuel cell system according to claim 2, wherein the second water recovery tank includes an oxidant-line water recovery tank that collects water discharged from the oxidant electrode outlet of the fuel cell.

25 4. The fuel cell system according to claim 3, further comprising:

an oxidant-line water discharge flow passage closure unit operative to open and close an oxidant-line water discharge flow passage extending from a lower portion of the second water recovery tank; and

30 an oxidant-line water discharge discriminator discriminating to find whether collected water in the second water recovery tank is to be discharged; wherein

35 when the fuel-line water discharge flow passage closure unit is opened or during a given time interval elapsed after the fuel-line water discharge flow passage closure unit has been closed, the oxidant-line water discharge flow

passage closure unit is not opened even if the oxidant-line water discharge discriminator discriminates to discharge the collected water from the second water recovery tank.

5 5. The fuel cell system according to claim 1, further comprising:

a fuel pressure detector disposed in a fuel gas flow passage connected to a fuel electrode inlet of the fuel cell to detect a fuel pressure; wherein

when the fuel pressure detected by the fuel pressure detector drops below a given value after the fuel-line water discharge flow passage closure unit has been opened, the fuel-line water discharge discriminator discriminates that discharging of the collected water in the fuel-line water recovery tank has been completed.

15 6. The fuel cell system according to claim 5, wherein the fuel-line water discharge flow passage has a flow sectional area smaller than a flow sectional area of a downstream of the fuel-line water discharge flow passage.

7. The fuel cell system according to claim 1, further comprising:

20 a fuel flow rate detector disposed in a fuel electrode inlet of the fuel cell to measure the flow rate of fuel gas; wherein

when the flow rate of fuel detected by the fuel flow rate detector exceeds a given value, the fuel-line water discharge discriminator discriminates that discharging of the collected water in the fuel-line water recovery tank has been completed.

25 8. The fuel cell system according to claim 1, wherein the fuel-line water discharge discriminator executes discrimination as to discharging of water based on at least any one of an operating load of the fuel cell, the temperature of the fuel-line and a time interval elapsed after the fuel-line water discharge flow passage closure unit has been previously closed.

9. The fuel cell system according to claim 1, further comprising:

35 a fuel-line gas discharge discriminator discriminating to find whether fuel expelled from the fuel electrode outlet of the fuel cell is to be discharged to a system outside; wherein

when the fuel is discharged to the system outside, the fuel-line water discharge flow passage closure unit is opened.

10. The fuel cell system according to claim 9, further comprising:

5 a fuel pressure detector disposed in a fuel electrode inlet of the fuel cell to detect a fuel pressure; wherein

on the basis of a time interval elapsed from a timing at which, after the fuel-line water discharge flow passage closure unit has been opened, a fuel pressure detected by the fuel pressure detector drops below a given value, the fuel-line gas discharge discriminator discriminates that discharging of fuel-line gas has been completed.

11. The fuel cell system according to claim 9, further comprising:

15 a fuel flow rate detector disposed in a fuel gas flow passage connected to a fuel electrode inlet of the fuel cell to measure the flow rate of fuel gas; wherein

on the basis of the flow rate of the fuel detected by the fuel flow rate detector and a fuel consumption rate predicted from an operating load of the fuel cell, the fuel-line gas discharge discriminator discriminates to find whether discharging of fuel-line gas to the system outside has been completed.

12. The fuel cell system according to claim 9, wherein the fuel-line gas discharge discriminator executes discrimination as to discharging of fuel gas based on at least any one of an operating load of the fuel cell, a time interval elapsed after the fuel-line water discharge flow passage closure unit has been previously closed, and a voltage of the fuel cell.

13. A fuel cell system comprising:

30 a fuel-line water recovery tank collecting water discharged from a fuel electrode outlet of a fuel cell;

fuel-line water discharge discriminating means for discriminating to find whether collected water in the fuel-line water recovery tank is to be discharged;

35 a combustor disposed in a downstream of a fuel-line water discharge port

of the fuel-line water recovery tank to allow fuel expelled from the fuel-line water discharge port to be combusted with oxidant expelled from an oxidant electrode outlet of the fuel cell; and

fuel-line water discharge flow passage closure means operative to open and close a fuel-line water discharge flow passage between the fuel-line water discharge port and the combustor; wherein

when the fuel-line water discharge discriminating means discriminates that the collected water is to be discharged, the fuel-line water discharge flow passage closure means is opened.

14. A method of operating a fuel cell system, the method comprising:

preparing a fuel cell having a fuel electrode outlet and an oxidant electrode outlet;

preparing a fuel-line water recovery tank collecting water discharged from the fuel electrode outlet;

preparing a combustor disposed in a downstream of a fuel-line water discharge port of the fuel-line water recovery tank;

preparing an fuel-line water discharge flow passage closure unit operative to open and close a fuel-line water discharge flow passage between the fuel-line water discharge port and the combustor;

executing discrimination by a fuel-line water discharge discriminator to find whether collected water in the fuel-line water recovery tank is to be discharged;

combusting fuel, expelled from the fuel-line water discharge port, with oxidant, expelled from the oxidant electrode outlet, in the combustor; and

opening the fuel-line water discharge flow passage closure unit when the fuel-line water discharge discriminator discriminates that the collected water is to be discharged.